hESC-derived Olig2(+) progenitors generate a subtype of astroglia with protective effects against ischaemic brain injury.

Journal: Nat Commun

Publication Year: 2013

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PubMed link: 23880652

Funding Grants: UC Davis Stem Cell Training Program

Public Summary:
Human pluripotent stem cells (hPSCs) have been differentiated to astroglia, but the utilization of hPSC-derived astroglia as cell therapy for neurological diseases has not been well studied. Astroglia are heterogeneous, and not all astroglia are equivalent in promoting neural repair. A prerequisite for cell therapy is to derive defined cell populations with superior therapeutic effects. Here we use an Olig2-GFP human embryonic stem cell (hESC) reporter to demonstrate that hESC-derived Olig2(+) progenitors generate a subtype of previously uncharacterized astroglia (Olig2PC-Astros). These Olig2PC-Astros differ substantially from astroglia differentiated from Olig2-negative hESC-derived neural progenitor cells (NPC-Astros), particularly in their neuroprotective properties. When grafted into brains subjected to global ischaemia, Olig2PC-Astros exhibit superior neuroprotective effects and improved behavioural outcome compared to NPC-Astros. Thus, this new paradigm of human astroglial differentiation is useful for studying the heterogeneity of human astroglia, and the unique Olig2PC-Astros may constitute a new cell therapy for treating cerebral ischaemia and other neurological diseases.

Scientific Abstract:
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